42-079-00014

UGI Development Company

390 Route 11
P.O. Box 224
Hunlock Creek, PA 18621-0224
(570) 830-1269

March 7, 2006

RECEIVED
MAR 13 2006

CERTIFIED MAIL 7002 0860 0000 1118 1942

Mrs. Rene McLaughlin
3 AP 2
United States Environmental Protection Agency
Region 3
1650 Arch Street
Philadelphia, PA 19103-2025

RE: ***UGI Development Company***
RATA Notification - Units No. 4 and 6

Dear Mrs. McLaughlin:

This letter is to notify you that UGI Development Company is tentatively scheduled to perform the Annual RATA Testing on Hunlock Power Station's Units No. 6 (Coal Unit) and No. 4 (Combustion Turbine) for the week of April 3, 2006.

If you should have any questions, please call me at (570) 830-1267.

Sincerely,

Jeffrey T. Steeber

Jeffrey T. Steeber
Staff Engineer
Hunlock Power Station

JTS:chet

CATALYST
AIR MANAGEMENT, INC.

AIR QUALITY TESTING SERVICES

UGI DEVELOPMENT COMPANY
HUNLOCK STATION
UNIT 4 CT

CEMS RATA PROTOCOL

Catalyst Air Management, Inc.
Project Number 124-132

FEBRUARY 16, 2006

2505 Byington-Solway Road
Knoxville, TN 37931
(865) 531-0075 • Fax (865) 531-0750

29541 Morningmist Drive
Wesley Chapel, FL 33543
(813) 994-5880 • Fax (813) 994-5571

10 Mill Road
Morgantown, PA 19543
(610) 913-7600 • Fax (610) 913-7608

CATALYST
AIR MANAGEMENT, INC.

UGI DEVELOPMENT COMPANY
HUNLOCK STATION
UNIT 4 CT

CEMS RATA PROTOCOL

CATALYST AIR MANAGEMENT, INC.
PROJECT NUMBER 124-032

February 16, 2006

Prepared for
Mr. Jeff Stever
UGI Development Company
Hunlock Station
US Route 11, PO Box 224
Hunlock Creek, PA 18621

CATALYST
AIR MANAGEMENT, INC.

STATEMENT OF VALIDITY

UGI Development Company – Hunlock Station
Catalyst Project 124-032
February 16, 2006

To the best of our knowledge, the applicable state and federal regulations, operating permits, or plan approvals applicable to each source and control device being tested have been reviewed and all the testing requirements have been incorporated into this test protocol.

Michael J. Taylor
President – Catalyst Air Management

Jeff Steeber
UGI Development Company

Jeff Steeber

TABLE OF CONTENTS

PROJECT FACT SHEET

NAME OF SOURCE OWNER:	UGI Development Company
SOURCE IDENTIFICATION:	Hunlock Station Unit 4
LOCATION OF SOURCE:	Route 11, PO Box 224 Hunlock Creek, PA 18621
TYPE OF OPERATION:	Combustion Turbine
TYPES OF TESTS PERFORMED:	Oxygen/Carbon Dioxide-EPA Method 3A Nitrogen Oxide-EPA Method 7E
CEMS DESCRIPTION:	TECO 42CHL NOx Sevomex 1440C O_2
TEST COMPANY:	Catalyst Air Management, Inc. 2505 Byington-Solway Road Knoxville, TN 37931
SITE SUPERVISOR:	Jeff Ferguson - Principal
TEST PERSONNEL:	Mark Williams - Technician
PROPOSED TEST DATES:	April 3, 2006
OWNERS REPRESENTATIVE:	Jeff Steeber
TEST OBSERVER:	

1.0 Introduction

Catalyst Air Management, Inc. (Catalyst) has been contracted by UGI Development Company (UGI) to perform the annual Continuous Monitoring System (CEMS) Relative Accuracy Test Audit (RATA) for the CT at the Hunlock Station in Hunlock Creek, PA.

The sampling program is scheduled for the week of April 3, 2006. The Catalyst contact is Mike Taylor (865) 531-0075 or Jeff Ferguson (610) 913-7600. Mr. Jeff Steeber of UGI will coordinate plant and CEMS operation during the testing.

2.0 Description of Process

The Hunlock Station, CT, is a GE LM6000PC natural gas fired turbine operating in the simple cycle mode. The turbine is equipped with water injection in the combustion zone for NOx control. A process diagram is included in the figure section.

3.0 Description of Sampling Locations

The stack is 75 feet high, with an inside diameter of 9.0 feet. The sampling location is approximately 10 feet upstream (1.1 diameters) from the stack exit and 50 feet downstream (5.6 diameters) of the inlet duct. A schematic of the sampling location is included in the figures section.

4.0 Description of CEMS

The CEMS is a heated extractive system that measures NOx and O_2 concentrations at the sampling location. The CEMS analyzers includes a Thermo Environmental Model 42CHL NOx analyzer and a Servomex Model 1440C O_2 analyzer. The recording and reporting requirements are performed by a computerized data acquisition and handing system.

CEMS

(1) Thermo Environmental 42CHL NOx
(1) Servomex 1440C O_2

The analyzers measure on a dry basis. The data acquisition and handling system utilizes a Fo factor of 8710 scf/mmBtu to calculate NOx emissions in lbs/mmBtu.

5.0 Sampling Program Procedures

The following test methods were utilized during the test program:

EPA Method 3A	Gas Analysis for CO_2, O_2, Excess Air and Dry Molecular Weight (Instrumental Analyzer Method)
EPA Method 7E	Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Method)

5.1 NOx, SO_2 and CO_2 – EPA Methods 3A and 7E

A sample is continuously extracted and introduced into a Thermo Environmental Model 10, Chemiluminescent NOx analyzer and Servomex 1400 O_2/CO_2 analyzer for determination of gas concentrations. The sample is extracted through a heated stainless steel probe, heated sample line and sample conditioner to dry the sample before it enters the analyzers. A sample flow control system is used to control the flow into the analyzers. The analyzers are calibrated prior to starting the testing with EPA Protocol 1, calibration gases. A system bias check is performed before each run by introducing the zero and upscale gas at the back end of the sample probe. The system bias check is repeated at the end of each test run to determine the analyzer zero and calibration drift.

Nine (9) to twelve (12) test runs will be conducted with each being twenty-one (21) minutes in duration. A three (3) point traverse will performed during each run.

The NOx analyzer span as expected to be 0-25 ppm. The O_2/CO_2 analyzer spans are 0-25% and 0-20%, respectively. The calibration gases that will be utilized are zero, 40-60% and 80-100% of span.

Reference Method Analyzers:

Manufacturer	Model	Pollutant	Span
TECO	10A	NOx	0-25 ppm
Servomex	1400B	CO_2/O_2	0-20%/0-25%

The Catalyst reference method values are on a dry basis. The reference method emission rates, in lbs/mmBtu, will be calculated using the measured O_2 values and equation 19-1 in EPA Method 19. The reference method emission rate (lbs/mmBtu) will be compared to the CEMS lbs/mmBtu as recorded by the plant data acquisition system and the relative accuracy calculated.

The CEMS heat input (mmBtu/hr) will be used to determine the NOx emission rate (lb/hr) to compare to the CEMS lb/hr as recorded by the data acquisition system and the relative accuracy calculated.

All the procedures used for the RATA program were performed in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A, and Appendix B, Performance Specifications 2, 3 and 6, Part 75 and the Source Testing Manual Rev 3.3.

6.0 Quality Assurance Procedures

The quality assurance procedures followed during the testing activities followed guidelines set forth by the previous mentioned methods and the EPA Quality Assurance Handbook for Source Sampling. The specific procedures for this test program are listed below.

6.1 Instrumental Methods

Analyzer calibrations, system bias check and drift checks were completed before and after each sample run utilizing EPA Protocol 1 calibration gases.

The analyzer interference responses were determined in accordance with Section 5.4 of Method 20 and Section 7.2 through 7.6 of Method 6C.

The NOx analyzer NO_2 to NO converter efficiency is determined in accordance with Section 5.6 of Method 20.

7.0 Unit Operational Data

UGI will be responsible for the operation of the CT and CEMS. UGI personnel will provide documentation for operational conditions maintained during the testing. The CEMS data acquisition and handling system (DAHS) will provide emissions data to determine the system relative accuracy. The testing will be performed with the unit operating at 80-100% load.

8.0 Test Report

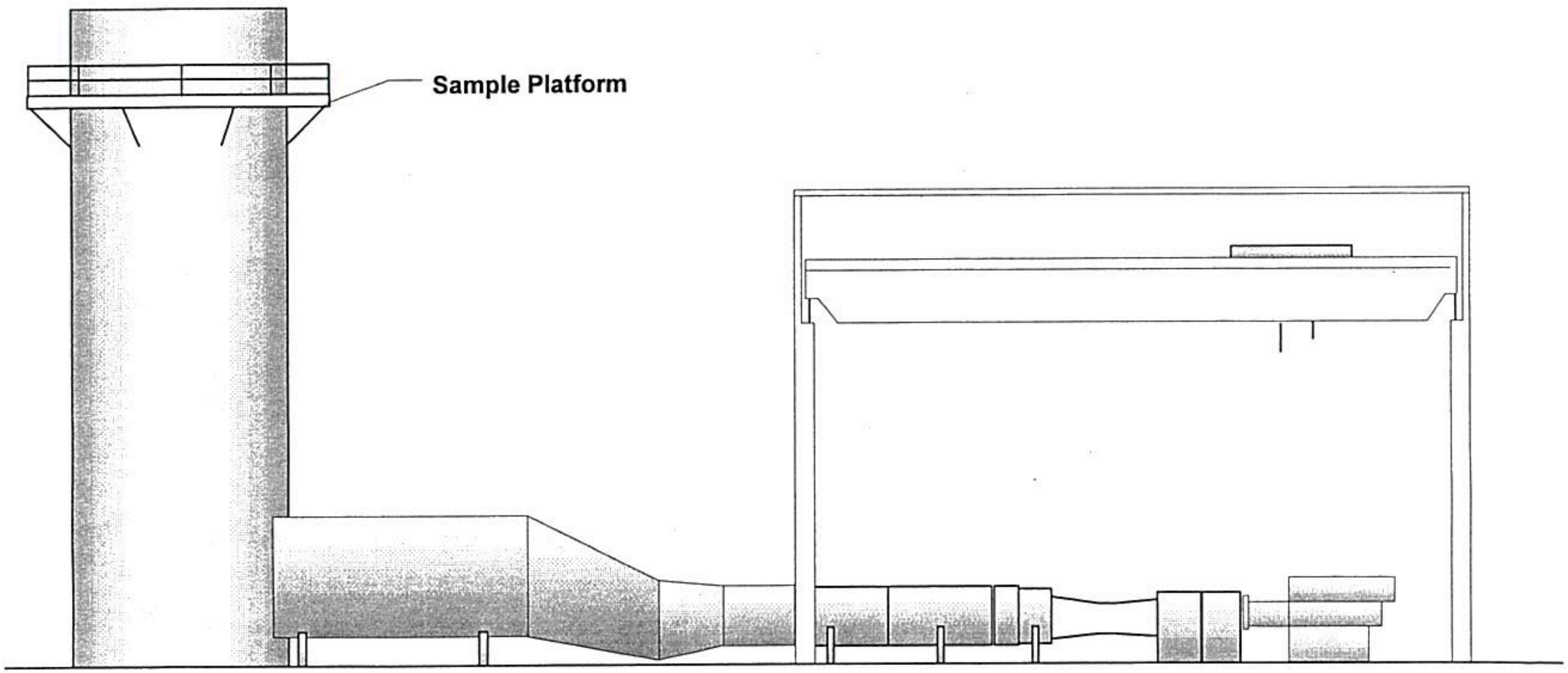
The test report will be submitted that will provide the results of the test program and all the pertinent information pertaining to the individual tests. The report will include the following:

- Unit description
- Sampling location and test points
- Unit operating data and production data
- Test personnel
- Test results and discussion of the test program
- Raw test data
- Equipment calibration and test method QA
- Sample calculations

ATTACHMENT 1

Figures

CATALYST AIR MANAGEMENT, INC.



GENERAL ARRANGEMENT

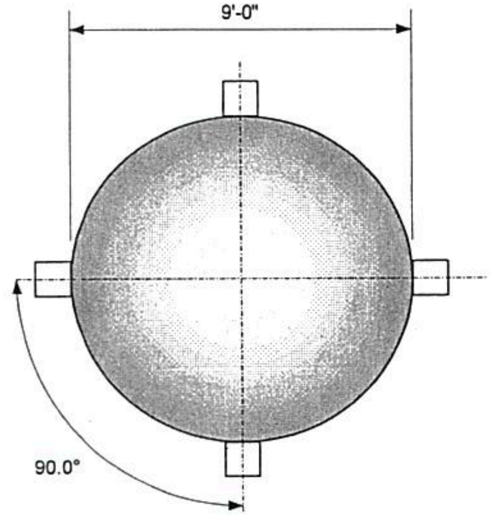
TITLE		
UGI UTILITIES, INC. - HUNLOCK STATION		
DESCRIPTION: CT GENERAL ARRANGEMENT		DATE: 8/30/00
SCALE: None	DRAWN BY: MT TAYLOR	REVISED:

CATALYST
AIR MANAGEMENT, INC.

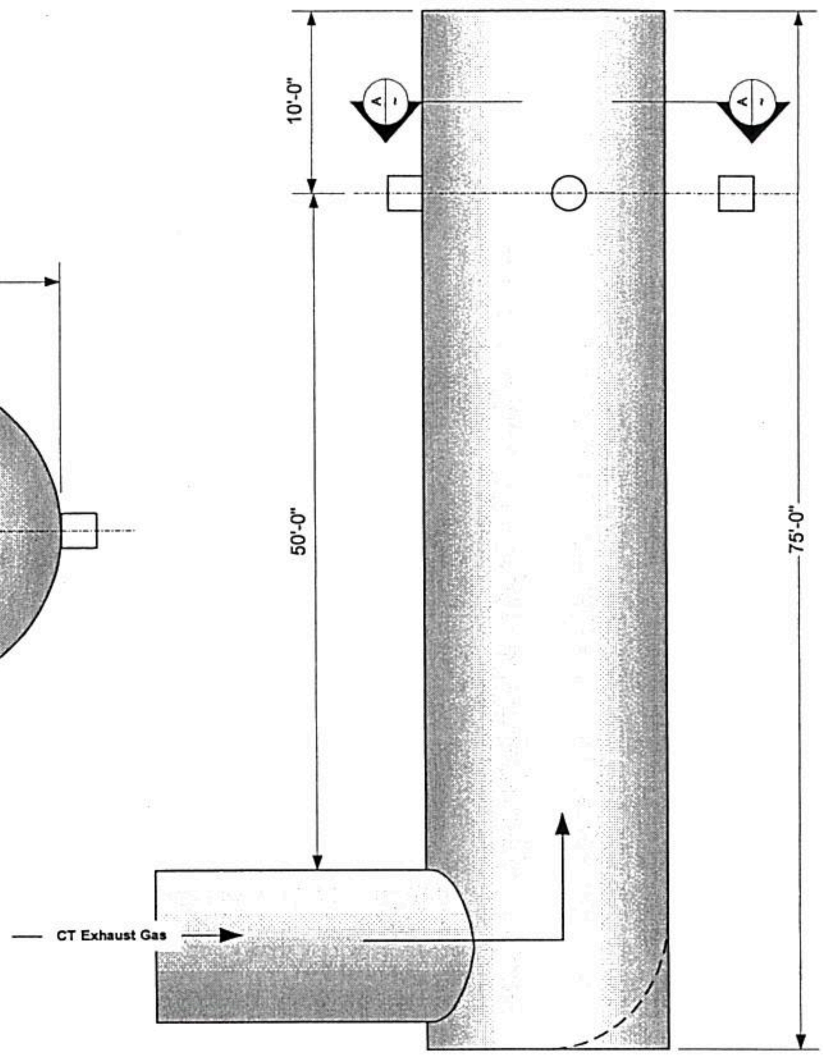
Traverse Location

(Meters) From inside of stack
Typical 4 Ports

1. 0.4
2. 1.2
3. 2.0

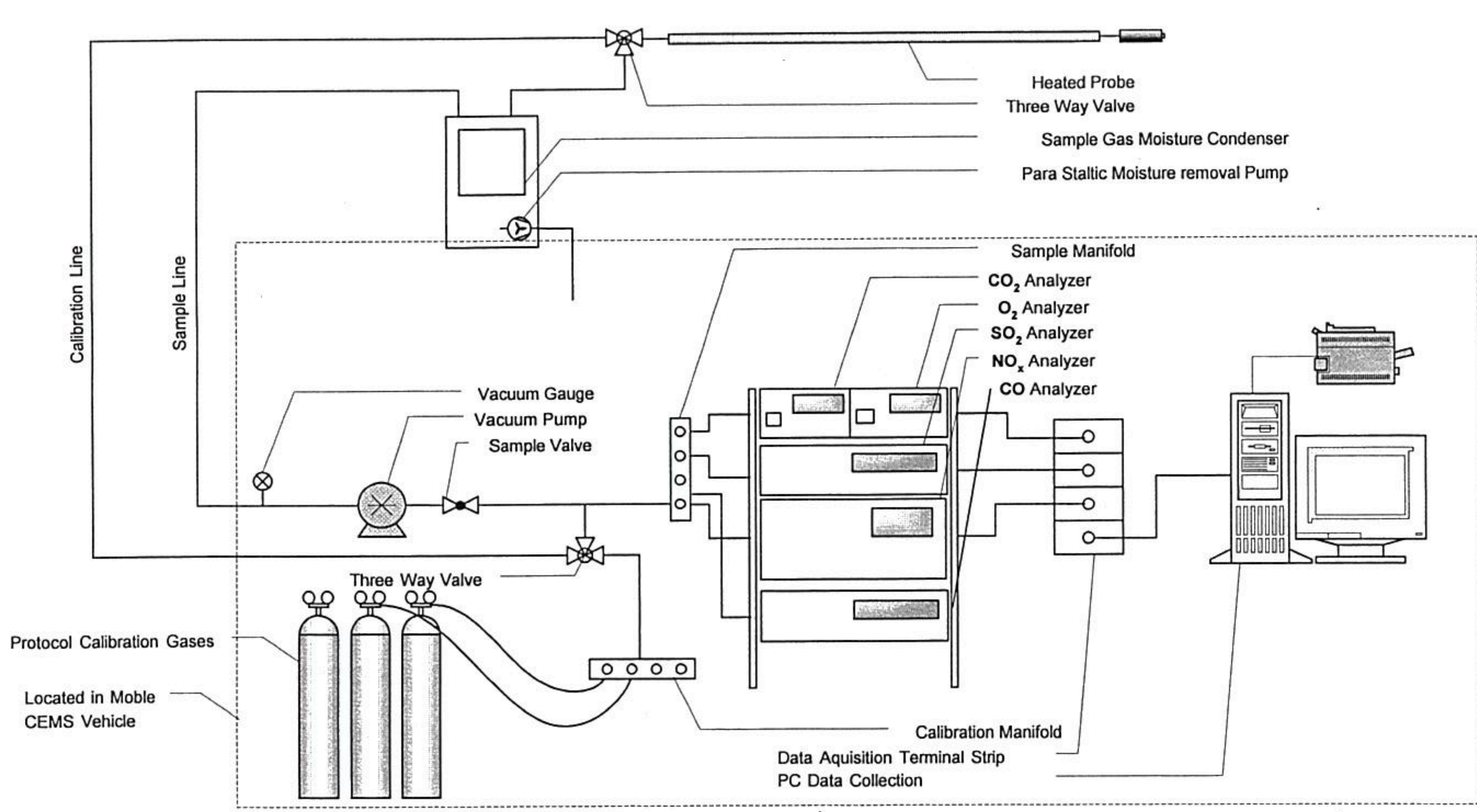


Section A-A
Scale: NONE



TITLE			
UGI UTILITIES, INC. - HUNLOCK STATION			
DESCRIPTION: CT STACK TEST LOCATIONS			DATE: 8/30/01
SCALE: NONE	DRAWN BY: MJ TAYLOR	REVISED:	

Catalyst Air Management, Inc.



TITLE		
EPA INSTRUMENTAL SAMPLE TRAIN		
DESCRIPTION: SAMPLE TRAIN SCHEMATIC		DATE: 01-26-98
SCALE: NONE	DRAWN BY: RF COBB	REVISED:

ATTACHMENT 2

Field Data Sheets

CATALYST AIR MANAGEMENT Inc.
TESTING SERVICES GROUP

DATE: ______ RUN #: ______

CLIENT: ______________ PLANT: ______ UNIT: ______

Analyzer: O_2 | CO_2 | NO_x

Scale: ______ | ______ | ______

	TIME:	O_2 Zero Gas:	O_2 Mid-Range:	O_2 High-Range:	CO_2 Zero Gas:	CO_2 Mid-Range:	CO_2 High-Range:	NO_x Zero Gas:	NO_x Mid-Range:	NO_x High-Range:
Cylinder Value										
Analyzer Calib.										
System Calib.										
Run 1 Start:										
End:										
System Calib.										
Run 2 Start:										
End:										
System Calib.										
Run 3 Start:										
End:										
System Calib.										
Run 4 Start:										
End:										
System Calib.										
Run 5 Start:										
End:										
System Calib.										
Run 6 Start:										
End:										
System Calib.										
Run 7 Start:										
End:										
System Calib.										
Run 8 Start:										
End:										
System Calib.										
Run 9 Start:										
End:										
System Calib.										
Run 10 Start:										
End:										
System Calib.										
Run 11 Start:										
End:										
System Calib.										
Run 12 Start:										
End:										

ATTACHMENT 3

Sample Calculations

CALCULATIONS FOR GAS CONCENTRATION

GAS CONCENTRATION (C_{gas})

$$C_{gas} = \left(\overline{C} - C_0\right)\left(\frac{C_{ma}}{C_m - C_o}\right)$$

C_{gas} = Effluent gas concentration, ppm

$\overline{C}$ = Average gas concentration indicated by gas analyzer, dry basis, ppm

C_0 = Average of initial and final system calibration bias check responses for the zero gas, ppm

C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm

C_{ma} = Actual concentration of the upscale calibration gas, ppm

CALCULATION FOR EMISSION RATE

1. **EMISSION RATE *E(lb/mmbtu)*,**

$$E(lb/mmbtu) = C \times F_d\left(\frac{20.9}{20.9 - \%O_2}\right)$$

$$E(lb/mmbtu) = C \times F_c(100/CO_2)$$

Where:

C(lb/dscf) = Pollutant concentration (ppm) x conversion factor.

Conversion Factors:

NOx = 1.194×10^{-7}
SO_2 = 1.660×10^{-7}
CO = 7.274×10^{-8}
C_3H_8 = 1.145×10^{-7}
CH_4 = 4.152×10^{-8}

F_d(dscf/mmbtu) = "F" Factor for fuel type, (Ref. EPA Method 19)

F_d (Coal) = 9780	F_c (Coal) = 1800
F_d (Gas) = 8710	F_c (Gas) = 1040
F_d (Oil) = 9190	F_c (Oil) = 1420

2. **Heat input *HI* (mmBtu/hr)**

*HI = fuel flow (cf/min) * Heat Value (mmBtu/cf)*60*

*HI = fuel flow (gal/min) * Heat Value (mmBtu/gal) * 60*

3. **Emission Rate *E(lb/hr)***

*E(lb/hr) = HI (mmBtu/hr) * E(lb/mmBtu)*

CALCULATION FOR RELATIVE ACCURACY

ARITHMETIC MEAN (of difference, d, of a data set)

$$d = \frac{1}{n}\sum_{i=1}^{n} d_i$$

Where n = Number of Data points.

ALGEBRAIC SUM (of the individual differences, d_i)

$$\sum_{i=1}^{n} d_i$$

STANDARD DEVIATION S_d

$$S_d = \left[\frac{\sum_{i=1}^{n} d_i^2 - \frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}}{n-1} \right]^{\frac{1}{2}}$$

CONFIDENCE COEFFICIENT, ***CC***

$$CC = t_{0.025}\frac{S_d}{\sqrt{n}}$$

For 9 tests	$t_{0.975} = 2.306$
For 10 tests	$t_{0.975} = 2.262$
For 11 tests	$t_{0.975} = 2.228$
For 12 tests	$t_{0.975} = 2.201$

RELATIVE ACCURACY, *RA*

$$RA = \frac{|\overline{d}| + |CC|}{\overline{RM}} \times 100$$

CATALYST

AIR MANAGEMENT, INC.

AIR QUALITY TESTING SERVICES

UGI DEVELOPMENT COMPANY
HUNLOCK STATION
UNIT 6

CEMS RATA PROTOCOL

Catalyst Air Management, Inc.
Project Number 124-131

FEBRUARY 16, 2006

2505 Byington-Solway Road
Knoxville, TN 37931
(865) 531-0075 • Fax (865) 531-0750

29541 Morningmist Drive
Wesley Chapel, FL 33543
(813) 994-5880 • Fax (813) 994-5571

10 Mill Road
Morgantown, PA 19543
(610) 913-7600 • Fax (610) 913-7608

CATALYST
AIR MANAGEMENT, INC.

UGI DEVELOPMENT COMPANY
HUNLOCK STATION
UNIT 6

CEMS RATA PROTOCOL

CATALYST AIR MANAGEMENT, INC.
PROJECT NUMBER 124-131

February 16, 2006

Prepared for
Mr. Jeff Steeber
UGI Development Comapny
Hunlock Station
US Route 11, PO Box 224
Hunlock Creek, PA 18621

CATALYST
AIR MANAGEMENT, INC.

STATEMENT OF VALIDITY

UGI Development Company – Hunlock Station
Catalyst Project 124-031
February 16, 2006

To the best of our knowledge, the applicable state and federal regulations, operating permits, or plan approvals applicable to each source and control device being tested have been reviewed and all the testing requirements have been incorporated into this test protocol.

Michael J. Taylor	Jeff Steeber
President – Catalyst Air Management	UGI Development Company

TABLE OF CONTENTS

PROJECT FACT SHEET

NAME OF SOURCE OWNER:	UGI Development Company
SOURCE IDENTIFICATION:	Hunlock Station Unit 6
LOCATION OF SOURCE:	Route 11, PO Box 224 Hunlock Creek, PA 18621
TYPE OF OPERATION:	Coal Fired Utility Steam Generator
TYPES OF TESTS PERFORMED:	Sample and Velocity Traverse-EPA Method 1 Volumetric Flow Rate-EPA Method 2F/H Oxygen/Carbon Dioxide-EPA Method 3A Moisture Content-EPA Method 4 Sulfur Dioxide-EPA Method 6C Nitrogen Oxide-EPA Method 7E Opacity-EPA Method 9
CEMS DESCRIPTION:	Air Monitor Mastron Flow - B26354 Thermo Environmental SO_2 - 43C-69110-362 Thermo Environmental NOx - 42C-69062-362 Thermo Environmental CO_2 - CHL-68209-359 Air Monitor RAC Opacity - 0045-65, 0018-65 VIM Technologies DAHS - 14787WIN
TEST COMPANY:	Catalyst Air Management, Inc. 2505 Byington-Solway Road Knoxville, TN
SITE SUPERVISOR:	Jeff Ferguson - Principal
TEST PERSONNEL:	Rick Derrera - Lead Technician Mark Williams - Technician
PROPOSED TEST DATES:	April 3, 2006
OWNERS REPRESENTATIVE:	Jeff Steeber
TEST OBSERVER:	

1.0 Introduction

Catalyst Air Management, Inc. (Catalyst) has been contracted by UGI Development Company (UGI) to perform the Continuous Monitoring System (CEMS) Relative Accuracy Test Audit (RATA) for Unit 6 at the Hunlock Station in Hunlock Creek, PA.

The sampling program is scheduled for the week of April 3, 2006. The Catalyst contact is Mike Taylor (865) 531-0075 or Jeff Ferguson (610) 913-7600. Mr. Jeff Steeber of UGI will coordinate plant and CEMS operation during the testing.

2.0 Description of Process

The Hunlock Station, Unit 6, is a pulverized coal fired boiler. No.2 fuel oil is used for ignition and flame stabilization. The boiler is is rated at 400,000 lbs/hr of steam at 1350 psig and 955 °F. It is a Foster Wheeler drum type, wet bottom, arch fired, balanced draft unit with a nominal heat input of 562 mmBtu/hr. The steam is supplied to a turbine/generator rated at approximately 50 MW. The flue gas is passed through a primary and secondary precipitator for particulate control. A process flow diagram is included in the figures section.

3.0 Description of Sampling Locations

The Unit 6 stack is 40.5 feet high, with an inside diameter of 9.5 feet. The sampling location is approximately 14.5 upstream from the stack exit and 27 feet downstream of the inlet duct. A schematic of the sampling location is included in the figures section.

4.0 Description of CEMS

The Unit 6 CEMS is a dilution extraction system that measures SO_2, NOx and CO_2 concentrations at the sampling location. The CEMS analyzers includes a Thermo Environmental Model 43H SO_2 analyzer, Thermo Environmental Model 42D NOx analyzer, Thermo Environmental Model 41CHL CO_2 analyzer and a Air Monitor Mastron Electron Flow monitor. The recording and reporting requirements are performed by a computerized data acquisition and handing system.

Unit 6 CEMS

(1) Thermo Environmental SO_2 - 43C - Serial No. - 43C-69110-362
(1) Thermo Environmental NOx - 42D - Serial No. - 42D-69062-362
(1) Thermo Environmental CO_2 - 41CHL - Serial No. - 41CHL-68209-359
(1) Air Monitor Mastron Electronic Flow- Serial No. B26354
VIM Technologies Data Acquisition and Handling System – Serial No.14787WIN

The analyzers measure on a wet basis. The data acquisition and handling system utilizes a Fc factor of 1910 scf/mmBtu to calculate NOx emissions in lbs/mmBtu.

5.0 Sampling Program Procedures

The following test methods were utilized during the test program:

EPA Method 1	Sample and Velocity Traverse for Stationary Sources
EPA Method 2F	Determination of Stack Gas Velocity and Volumetric Flow Rate with Three-dimensional Probes
EPA Method 2H	Determination of Stack Gas Velocity and Volumetric Flow Rate Taking into Account Velocity Decay Near the Stack Wall
EPA Method 3A	Gas Analysis for CO_2, O_2, Excess Air and Dry Molecular Weight (Instrumental Analyzer Method)
EPA Method 4	Determination of Moisture Content in Stack Gas
EPA Method 6C	Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Method)
EPA Method 7E	Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Method)
EPA Method 9	Visual Determination of the Opacity of Emissions from Stationary Sources

5.1 NOx, SO_2 and CO_2 – EPA Methods 3A, 6C and 7E

A sample is continuously extracted and introduced into a Thermo Environmental Model 10, Chemiluminescent NOx analyzer, a Western Research Model 721, SO_2 analyzer and Servomex 1400 O_2/CO_2 analyzer for determination of gas concentrations. The sample is extracted through a heated stainless steel probe, heated sample line and sample conditioner to dry the sample before it enters the analyzers. A sample flow control system is used to control the flow into the analyzers. The analyzers are calibrated prior to starting the testing with EPA Protocol 1, calibration gases. A system bias check is performed before each run by introducing the zero and upscale gas at the back end of the sample probe. The system bias check is repeated at the end of each test run to determine the analyzer zero and calibration drift. Nine (9) to twelve (12) test runs will be conducted with each being twenty-one (21) minutes in duration.

The NOx analyzer spans are expected to be 0-250 ppm. The SO_2 analyzer span is expected to be 0-1000. The O_2/CO_2 analyzer spans are 0-25% and 0-20%, respectively. The calibration gases that will be utilized are zero, 40-60% and 80-100% of span.

Reference Method Analyzers:

Manufacturer	Model	Pollutant	Span
TECO	10A	NOx	0-250 ppm
Western Research	721	SO_2	0-1000 ppm
Servomex	1400B	CO_2/O_2	0-20%/0-25%

5.2 Volumetric Flow Rate - EPA Method 2F/H

Traverse points and flow relative accuracy runs will be performed using EPA Methods 1, 2F, 2H, 3A and 4. The velocity and volumetric flow rate will be determined in accordance with procedures outlined in EPA Method 2F. The wall effect default value of 0.995 will be utilized according to EPA Method 2H. A DAT 3-D probe is connected to a series of calibrated magnehelics and manometers to determine the yaw and pitch angles, static pressure and pitch coefficient of the flue gas at each traverse point. The temperature of the flue gas is also determined at each traverse point.

A minimum of nine (9) test runs will be performed at each load condition. A moisture will be performed for every three (3) flow traverses.

5.3 Moisture – EPA Method 4

The moisture content will be determined in accordance with procedures outlined in EPA Method 4. The flue gas sample is extracted from the gas stream and the moisture content is determined by measuring the increase in volume of the impingers. The sampling train consists of the following equipment connected in series:

Stainless steel heated sample probe
A modified Greenburg-Smith impinger containing 100 ml of H_2O
A Greenburg-Smith impinger containing 100 ml of H_2O
A modified Greenburg-Smith impinger, empty
A modified Greenburg-Smith impinger containing approximately 250g of silica gel

The sample volume is measured by passing it through a calibrated dry gas meter. After the run, the impinger contents are measured for increase in volume. The silica gel is returned to the original tared container and weighed to determine moisture gain.

5.4 F Factor Determination

Coal samples will be collected during the testing in order to determine the dry F factor used to calculate the emission rates in lb/mmBtu.

5.5 Opacity

Catalyst will also conduct an opacity monitor audit by performing nine (9) visible emissions evaluations. The visible emission evaluations will be 15 minutes in duration. Each of the evaluations will generate 15 - one minute averages that will be compared to the one minute averages generated by the CEMS during the same time period. A certified visible emission evaluator will conduct the audit.

All the procedures used for the RATA program were performed in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A, and Appendix B, Performance Specifications 2, 3 and 6, Part 75 and the Source Testing Manual Rev 3.3.

6.0 Quality Assurance Procedures

The quality assurance procedures followed during the testing activities followed guidelines set forth by the previous mentioned methods and the EPA Quality Assurance Handbook for Source Sampling. The specific procedures for this test program are listed below.

6.1 Velocity/Volumetric Flow Rate

The 3-D probe will be visually inspected and calibrated to meet the design specifications of EPA Method 2F.

All legs of the probe will be leaked checked before and after each sample run.

The stack thermocouples will be calibrated prior to the testing and a post test check will be performed after the testing project.

The magnehelics will be leveled and zeroed before each sample run.

6.2 Moisture

The dry gas meter is fully calibrated annually using an EPA intermediate standard.

Post -test dry gas meter checks will be completed to verify the accuracy of the meter Yi.

Pre-test and post-test leak checks will be completed and were less than 0.02 cfm at the highest sampling vacuum.

6.3 Instrumental Methods

Analyzer calibrations, system bias check and drift checks were completed before and after each sample run utilizing EPA Protocol 1 calibration gases.

The analyzer interference responses were determined in accordance with Section 5.4 of Method 20 and Section 7.2 through 7.6 of Method 6C.

The NOx analyzer NO_2 to NO converter efficiency is determined in accordance with Section 5.6 of Method 20.

7.0 Unit Operational Data

UGI will be responsible for the operation of the units and CEMS. UGI personnel will provide documentation for operational conditions maintained during the testing. The CEMS data acquisition and handling system (DAHS) will provide emissions data to determine the system relative accuracy.

8.0 Test Report

The test report will be submitted that will provide the results of the test program and all the pertinent information pertaining to the individual tests. The report will include the following:

- Unit description
- Sampling location and test points
- Unit operating data and production data
- Test personnel
- Test results and discussion of the test program
- Raw test data
- Equipment calibration and test method QA
- Sample Calculations

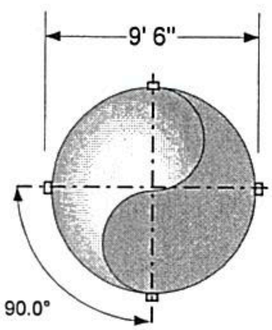
ATTACHMENT 1

Figures

CATALYST AIR MANAGEMENT, INC.

TRAVERSE POINTS (Typ 4 Ports)
FLOW
(Inches) from inside of stack.

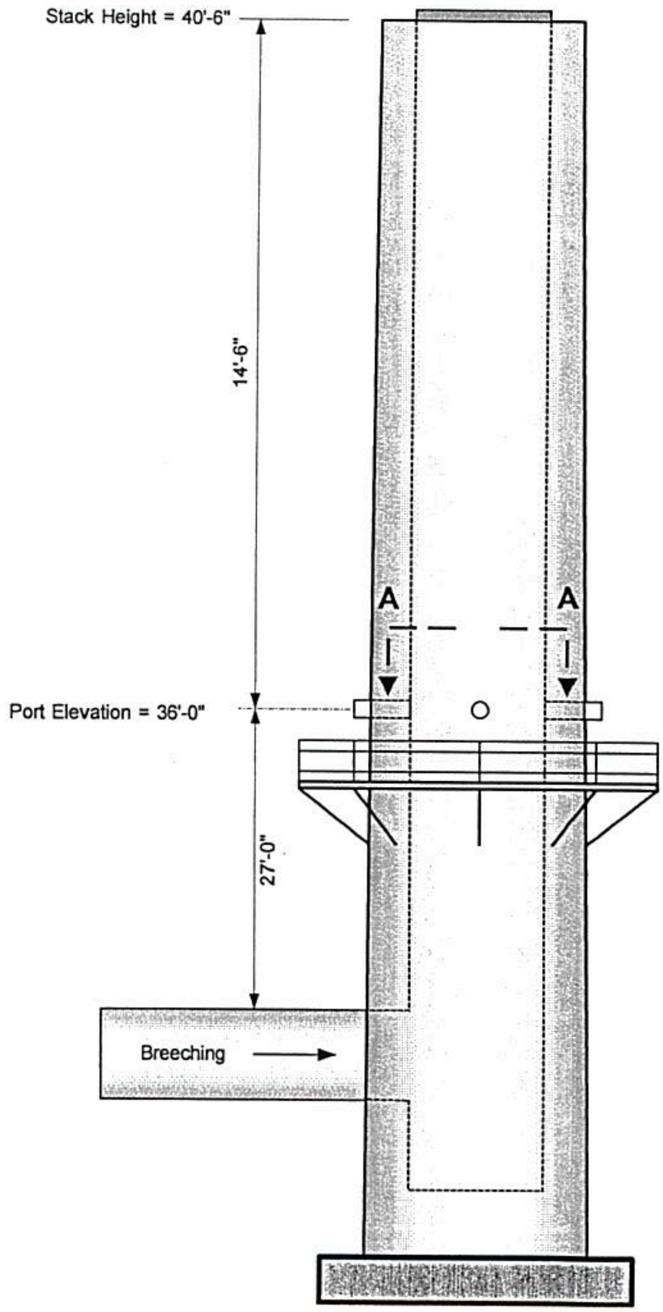
1. 3.6"
2. 12.0"
3. 22.1"
4. 36.8"



SECTION A - A

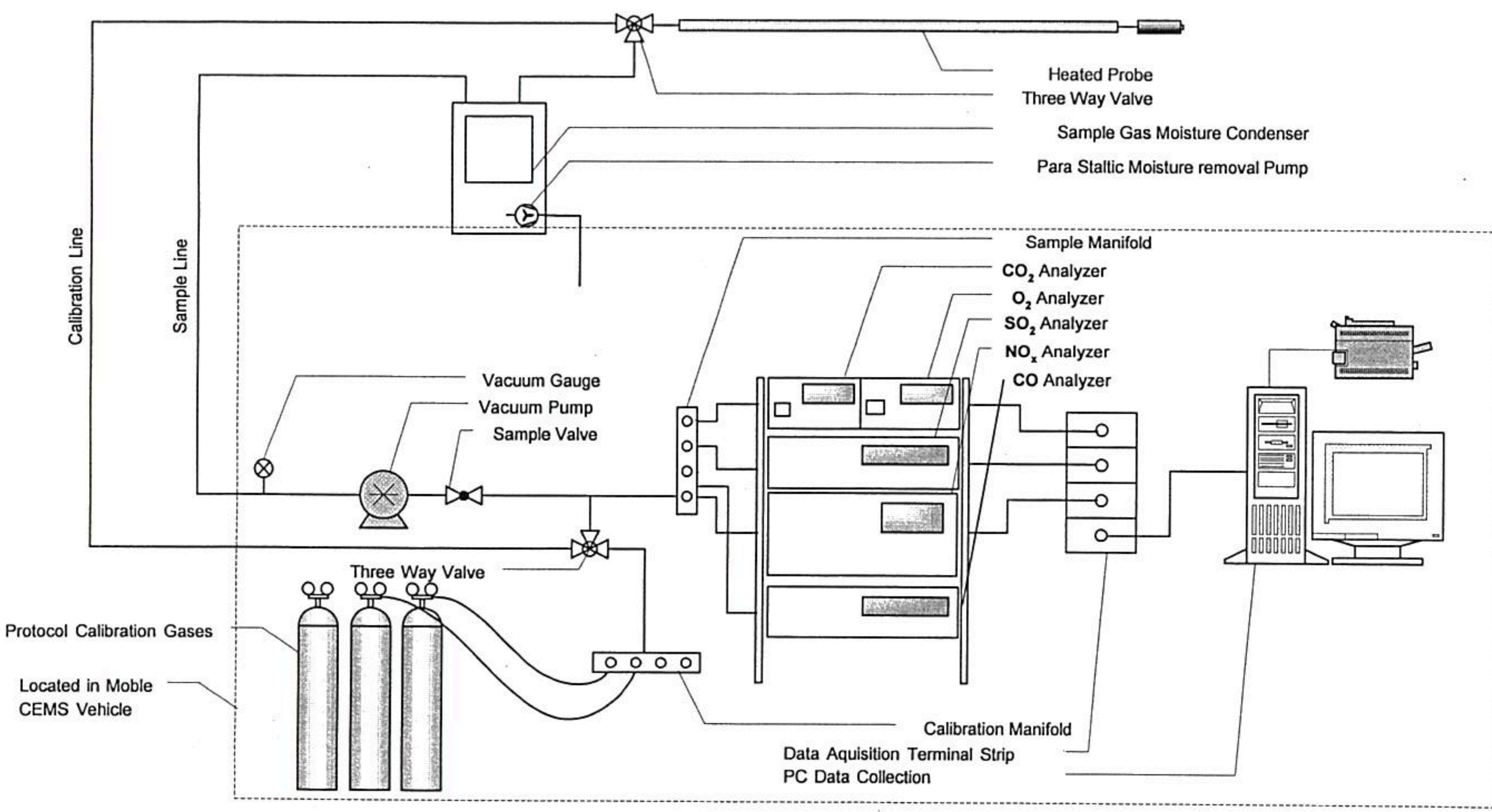
TRAVERSE POINTS (Typ 4 Ports)
(meters) from inside of stack.

1. 0.4
2. 1.2
3. 2.0



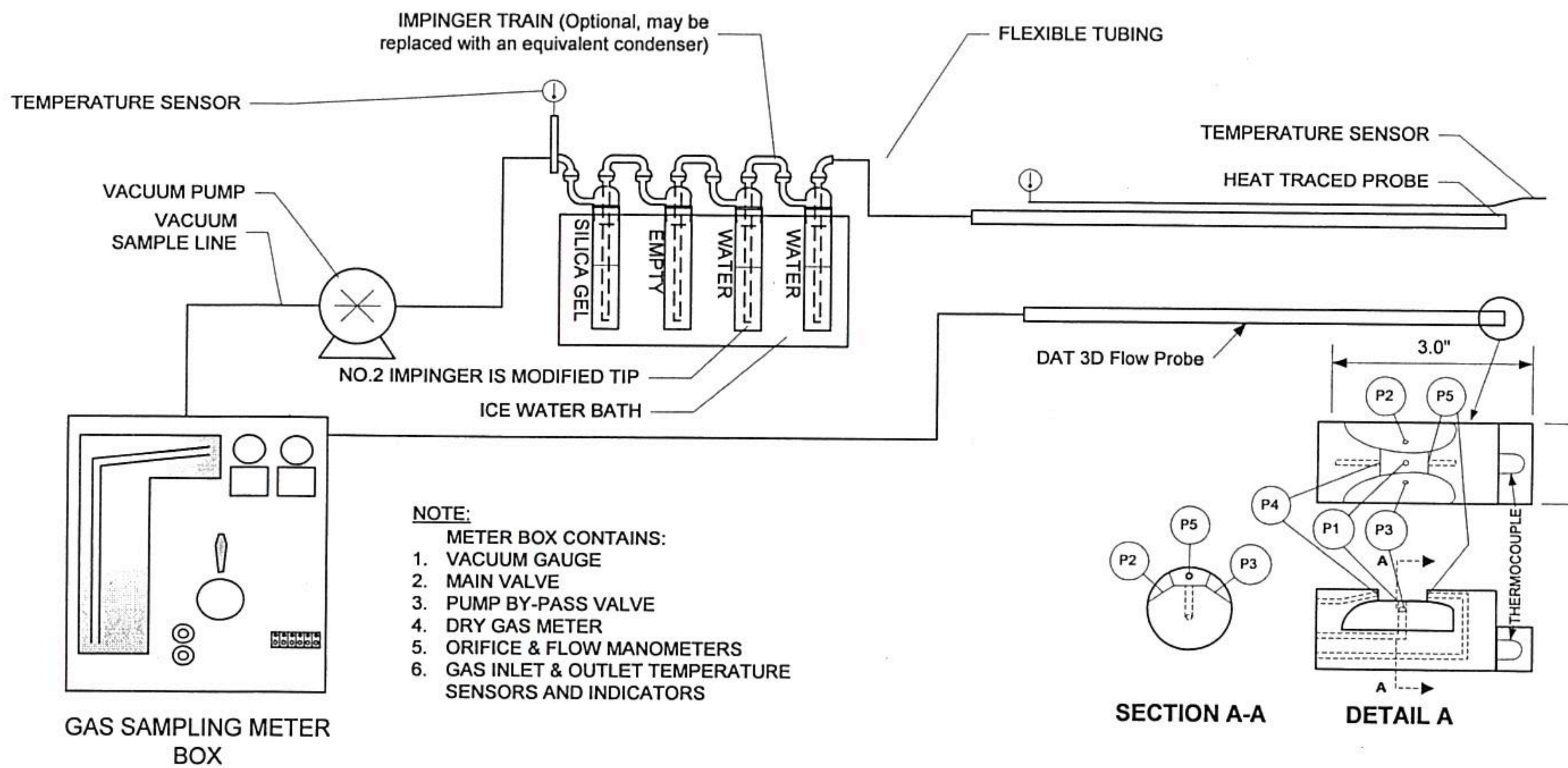
TITLE			
UGI DEVELOPMENT COMPANY - HUNLOCK STATION			
DESCRIPTION: UNIT 6 TEST PORT CONFIGURATION			DATE: 7/24/98
SCALE: NONE	DRAWN BY: MJ TAYLOR	REVISED:	

CATALYST AIR MANAGEMENT, INC.



TITLE: EPA INSTRUMENTAL SAMPLE TRAIN		
DESCRIPTION: SAMPLE TRAIN SCHEMATIC		DATE: 01-26-98
SCALE: NONE	DRAWN BY: RF COBB	REVISED:

CATALYST AIR MANAGEMENT, INC.



NOTE:

METER BOX CONTAINS:

1. VACUUM GAUGE
2. MAIN VALVE
3. PUMP BY-PASS VALVE
4. DRY GAS METER
5. ORIFICE & FLOW MANOMETERS
6. GAS INLET & OUTLET TEMPERATURE SENSORS AND INDICATORS

TITLE		
EPA METHOD 2F-4 SAMPLING TRAIN		
DESCRIPTION: 3-D FLOW & MOISTURE		DATE: 01-26-98
SCALE: NONE	DRAWN BY: RF COBB	REVISED: 9/8/2004

ATTACHMENT 2

Field Data Sheets

CATALYST AIR MANAGEMENT Inc.
TESTING SERVICES GROUP

DATE: ______ RUN #: ______

CLIENT: ______ PLANT: ______ UNIT: ______

Analyzer:	O_2	CO_2	NOx
Scale:			

	TIME:	O_2 Zero Gas:	O_2 Mid-Range:	O_2 High-Range:	CO_2 Zero Gas:	CO_2 Mid-Range:	CO_2 High-Range:	NOx Zero Gas:	NOx Mid-Range:	NOx High-Range:
Cylinder Value										
Analyzer Calib.										
System Calib.										
Run 1 Start:										
End:										
System Calib.										
Run 2 Start:										
End:										
System Calib.										
Run 3 Start:										
End:										
System Calib.										
Run 4 Start:										
End:										
System Calib.										
Run 5 Start:										
End:										
System Calib.										
Run 6 Start:										
End:										
System Calib.										
Run 7 Start:										
End:										
System Calib.										
Run 8 Start:										
End:										
System Calib.										
Run 9 Start:										
End:										
System Calib.										
Run 10 Start:										
End:										
System Calib.										
Run 11 Start:										
End:										
System Calib.										
Run 12 Start:										
End:										

CATALYST AIR MANAGEMENT Inc. **PAGE 2**
TESTING SERVICES GROUP

DATE: ______ **RUN #:** ______

Analyzer:		**SO_2**			______				______		
Scale:		______			______				______		
	TIME:	**Zero Gas:**	**Mid-Range:**	**High-Range:**	**Zero Gas:**	**Low-Range:**	**Mid-Range:**	**High-Range:**	**Zero Gas:**	**Mid-Range:**	**High-Range:**
Cylinder Value											
Analyzer Calib.											
System Calib.											
Run 1 Start:											
End:											
System Calib.											
Run 2 Start:											
End:											
System Calib.											
Run 3 Start:											
End:											
System Calib.											
Run 4 Start:											
End:											
System Calib.											
Run 5 Start:											
End:											
System Calib.											
Run 6 Start:											
End:											
System Calib.											
Run 7 Start:											
End:											
System Calib.											
Run 8 Start:											
End:											
System Calib.											
Run 9 Start:											
End:											
System Calib.											
Run 10 Start:											
End:											
System Calib.											
Run 11 Start:											
End:											
System Calib.											
Run 12 Start:											
End:											

CATALYST AIR MANAGEMENT Inc.
TESTING SERVICES GROUP

FLOW DATA

CLIENT: ____________ RUN #: ____________ PROBE ID: ____________
PLANT: ____________ LOAD: ____________ TC ID: ____________
DATE: ____________ STATIC: ____________ Pre Leak: ____________
UNIT: ____________ BAROMETER: ____________ Post Leak: ____________

TIME (24 HR. CLOCK)	SAMPLE POINT	STACK TEMP °F	Yaw Angle degrees	Velocity Pressure (P1-P2)	Pitch Pressure (P4-P5)

MOISTURE DATA

Meter Box: ____________ Yi: ____________

POINT	CLOCK TIME	RUN TIME	DRY GAS METER	ORIFICE PRESSURE	METER TEMP °F INLET	OUTLET
		0				
		5				
		10				
		15				
		20				
		25				
		30				

IMPINGERS ____________
____
____

FINAL VOLUME ____________
INITIAL VOLUME 200
NET VOLUME ____________

SILICA GEL
FINAL WEIGHT ____________
INITIAL WEIGHT ____________
NET WEIGHT ____________

IMPINGERS ____________
SILICA GEL ____________
TOTAL MOISTURE ____________

ATTACHMENT 3

Sample Calculations

SAMPLE EQUATIONS
FOR CEMS RELATIVE ACCURACY TEST AUDITS

CALCULATIONS FOR FLUE GAS VOLUME AND MOISTURE

Time	Dry Gas Meter Ft^3	Pitot ΔP In. H_2O	Orifice ΔH In. H_2O	Dry Gas Temp.°F In Out	Flue Gas Static Pressure In. H_2O	Stack Temp °F
T	V_m	Δp	ΔH	TMI TMO	P_g	T_s

1. P_{bar} = Barometric Pressure (in. Hg)

2. TT = Net Sampling Time (minutes)

3. $V_m = V_m$ Final - V_m Initial = Sample Gas Volume (Ft^3)

4. T_m = Average Dry Gas Temperature at Meter (°F)

$$T_m = \frac{Avg.TMI + Avg.TMO}{2}$$

5. Δp = Velocity head of stack gas (in. H_2O)

6. ΔH = Average Orifice Pressure Drop (in.H_2O)

7. Volume of dry gas sampled at standard conditions[a] (DSCF)

$$V_{m(std)} = \frac{(17.64)(V_m)(Y)\left(P_{bar} + \frac{\Delta H}{13.6}\right)}{(T_m + 460)}$$

8. V_{lc} = Total Water Collected = gm H_2O Silica gel + ml Imp. H_2O = ml

9. Volume of water vapor at standard conditions[b] (SCF)

$$V_{w(std)} = 0.0471(V_{lc}) = SCF$$

10. Percent moisture in flue gas

$$\% M = \frac{100(V_{w(std)})}{V_{m(std)} + V_{w(std)}}$$

11. Mole fraction of water vapor in flue gas

$$B_{ws} = \frac{\% M}{100}$$

12. Molecular Weight of dry flue gas

$$M_d = 0.44(\% CO_2) + 0.32(\% O_2) + 0.28(\% N_2 + \% CO)$$

13. Molecular weight of wet flue gas

$$M_s = M_d(1 - B_{ws}) + 18(B_{ws})$$

14. A = Cross-sectional area of stack (Ft^2)

$$\frac{\pi r^2}{144}$$

15. P_s = Flue gas pressure (in, Hg)

$$P_s = P_{bar} + P_g$$

NOTE: $$P_g(Hg) = \frac{P_g(in.H_2O)}{13.6}$$

16. T_s = Absolute stack temperature (°R)

$$T_s = 460 + t_s$$

17. Flue velocity at stack conditions (FT/SEC)

$$V_s = (K_p)(C_p)\left[\left(\sqrt{\Delta p}\right)avg\right]\sqrt{\frac{T_s(avg)}{P_s * M_s}}$$

C_p = pitot tube coefficient
K_p = pitot tube constant = 85.49ft/sec

18. Flue gas volumetric flow rate at standard conditions[b] (SCFM)

$$Q_s = (V_s)(A)\left(\frac{528}{T_s(avg.)}\right)\left(\frac{P_s}{29.92}\right)(60)$$

19. Flue gas volumetric flow rate at standard conditions[c] (DSCFM)

$$Q_{sd} = (1 - B_{ws})(V_s)(A)\left(\frac{528}{T_s(avg.)}\right)\left(\frac{P_s}{29.92}\right)(60)$$

20. Flue gas volumetric flow rate at stack conditions (ACFM)

$$Q_a = (V_s)(A)(60)$$

NOTES: [a]Dry standard cubic feet at 68°F, 29.92 in. Hg
[b]Standard conditions at 68°F, 29.92 in. Hg
[c]Dry standard cubic feet per minute at 68°F, 29.92 in. Hg

CALCULATIONS FOR 3-D PITOT TUBE VELOCITY

RESULTANT ANGLE R_i

$$R_I = \text{arc cosine} [(\text{cosine } Yi) * (\text{cosine } Pi)]$$

AXIAL VELOCITY

$$V_I = Kp * F_2 * [Ti (P_1-P_2)/(Pa * Ms)]^{0.5} * (\text{cosine } Yi) * (\text{cosine } Pi)$$

V_i	=	Velocity at point i, fps
Kp	=	Conversion factor 85.49
Ti	=	Absolute stack temperature at point i, °R
P_1-P_2	=	Pressure differential from 3-D probe, in H_2O
Pa	=	Absolute stack pressure, in Hg
Ms	=	Molecular weight of stack gas, lb/lb-mole
F_2	=	3-D pitot coefficient, [(Pt-Ps)/P_1-P_2)]
Pt-Ps	=	Velocity pressure from standard type pitot, in H_2O
C_{ps}	=	Standard pitot tube coefficient

F-FACTOR DETERMINATION

THE WET F-FACTOR (F_w):

Includes all components of combustion

$$F_w = \frac{10^6\,Btu/mmBtu\left[5.57(\%H)+1.53(\%C)+0.57(\%S)+0.14(\%N)-0.46(\%O_2)+0.21(\%H_2O)\right]}{GCV_{wet}}$$

THE DRY F-FACTOR (F_d):

Includes all components of combustion less water

$$F_d = \frac{10^6\,Btu/mmBtu\left[3.64(\%H)+1.53(\%C)+0.57(\%S)+0.14(\%N)-0.46(\%O_2)\right]}{GCV_{dry}}$$

THE CARBON F-FACTOR (F_c):

Includes only Carbon Dioxide

$$F_c = \frac{10^6\,Btu/mmBtu\left[0.321(\%C)\right]}{GCV_{dry}}$$

References for the above equations (i.e. %H, %C, %N, %S, $\%O_2$) can be found in 40 CFR Part 60, Appendix A, Method 19.

CALCULATION FOR GAS CONCENTRATION

GAS CONCENTRATION (C_{gas})

$$C_{gas} = \left(\overline{C} - C_0\right)\left(\frac{C_{ma}}{C_m - C_o}\right)$$

C_{gas}	=	Effluent gas concentration, ppm
$\overline{C}$	=	Average gas concentration indicated by gas analyzer, dry basis, ppm
C_0	=	Average of initial and final system calibration bias check responses for the zero gas, ppm
C_m	=	Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
C_{ma}	=	Actual concentration of the upscale calibration gas, ppm

GAS CONCENTRATION @ 15% O_2 (C_{gas} @ 15% O_2)

$$C_{gas} @ 15\%\ O_2 = C_{gas} * ((20.9-15)/(20.9-\%O_2))$$

GAS CONCENTRATION @ 7% O_2 (C_{gas} @ 7% O_2)

$$C_{gas} @ 7\%\ O_2 = C_{gas} * ((20.9-7)/(20.9-\%O_2))$$

GAS CONCENTRATION @ 3% O_2 (C_{gas} @ 3% O_2)

$$C_{gas} @ 3\%\ O_2 = C_{gas} * ((20.9-3)/(20.9-\%O_2))$$

LBS/MMBTU CALCULATIONS USING THE F-FACTOR

1. EMISSION RATE *E(lb/mmbtu)*, O_2 based

$$E(lb/mmbtu) = C \times F_d\left(\frac{20.9}{20.9 - \%O_2}\right)$$

Where:

C(lb/dscf) = Pollutant concentration (ppm) x conversion factor.

Conversion Factors:

NOx = 1.194×10^{-7}

SO_2 = 1.660×10^{-7}

CO = 7.274×10^{-8}

C_3H_8 = 1.145×10^{-7}

F_d(dscf/mmbtu) = "F" Factor for fuel type, (Ref. EPA Method 19)

F_d (Coal) = 9780

F_d (Gas) = 8710

F_d (Oil) = 9190

2. EMISSION RATE *E(lb/mmbtu)*, CO_2 based

$$E(lb/mmbtu) = C \times F_c\left(\frac{100}{\%CO_2}\right)$$

Where:

C(lb/dscf) = Pollutant concentration (ppm) x conversion factor.

Conversion Factors:

NOx = 1.194×10^{-7}

SO2 = 1.660×10^{-7}

CO = 7.274×10^{-8}

C_3H_8 = 1.145×10^{-7}

F_c(dscf/mmbtu) = "F" Factor for fuel type, (Ref. EPA Method 19)

F_d (Coal) = 1800

F_d (Gas) = 1040

F_d (Oil) = 1420

CALCULATION OF RELATIVE ACCURACY

ARITHMETIC MEAN (OF THE DIFFERENCE , {d}, OF A DATA SET)

$$\bar{d} = \frac{1}{n}\sum_{i=1}^{n} d_i$$

Where n = Number of data points.

ALGEBRAIC SUM (OF THE INDIVIDUAL DIFFERENCES, $\{d_i\}$)

$$\sum_{i=1}^{n} d_i$$

STANDARD DEVIATION, S_d

$$S_d = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \left(\frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}\right)}{n-1}}$$

CONFIDENCE COEFFICIENT, CC

$$CC = t_{0.975}\frac{S_d}{\sqrt{n}}$$

For 9 tests $t_{0.975} = 2.306$

For 10 tests $t_{0.975} = 2.262$

For 11 tests $t_{0.975} = 2.228$

For 12 tests $t_{0.975} = 2.201$

RELATIVE ACCURACY, RA

$$RA = \frac{|\bar{d}| + |CC|}{\overline{RM}} x100$$